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cluding equipment, dogs and provisions, had been safely landed on Franz Joseph Land, on September 7, 1895. Two days later ice closed round the 'Windward' and she was frozen in for the winter. The crew remained on the ship, but joined in the efforts of the explorers (who took up their abode in treble-walled Russian log houses which they had brought with them from England) in procuring fresh meat for food. When the ship left the explorers they were starting on their journey northward with good hopes of being able to explore successfully the unknown polar regions.

THE Dominion Medical Association held its twenty-eighth annual convention under the presidency of Dr. W. Bayard, on August 28th.

THE Rev. Dr. Williamson, professor of astronomy in Queens University, died on September 27th, in Kingston, Ontario, at the age of 87 years.

MR. EPHRAIM W. BULL, the well-known agriculturalist, died on September 26th, at the age of 89.

EXPERIMENTS in marching have been recently undertaken by students of medicine in the Friedrich Wilhelm Institute in Berlin, at the request of the German War Office. The results as reported in *The British Medical Journal* are as follows: The marches performed varied from 22 to 33 miles in length and were undertaken in all weather. The weights carried were from 48 to 68 pounds. A march of 25 miles undertaken at a temperature of 60° F. had no ill effect even if continued for some days consecutively, but under the same conditions at a temperature of 70° F. it necessitated a rest of at least ten hours in the twenty-four. A load of 68 pounds carried 25 miles produced grave physiological disturbance and necessitated a complete rest on the following day, but if the distance were reduced to fifteen miles 60 pounds

could be carried day after day in ordinary summer weather without injurious effects.

A LETTER written to the *American Machinist* states that the new rule allowing inventors six months instead of two years' time in which to prosecute an application for a primary examination went into effect April 15, 1895. Pending cases will be affected as though the last office decision were upon that date; therefore, all applications which were pending before that date should be amended or argued before October 15, 1895.

#### UNIVERSITY AND EDUCATIONAL NEWS.

THE fifth annual Report of the U. S. Commissioner of Education, Dr. William T. Harris, for the year ending November 30th, 1893, states that the entire number of pupils in the schools and colleges of the United States was 15,083,630, 22.5 % of the population, an increase of 370,697 over the previous year. The number of pupils enrolled in the public schools was 13,510,719, an increase of 1.92 %. The average attendance showed an increase of 3.45 %. The attendance for each child was only during about one-fifth of the year. 122,056 men and 260,954 women were employed in teaching. The number of schoolhouses was 235,426, valued at \$398,435,039. It is stated that the value of school property and the common school expenditure have more than doubled during the preceding twenty years. The report contains statistics of public high schools, professional educational institutions and normal schools, and includes a review of systems of education in foreign countries; reports of the International Congress of Education at the World's Fair; criticisms on American education by representatives of the German government at Chicago; a report on American technological schools by Professor Riedler, of the Royal Polytechnicum at Charlottenburg, near Berlin, and

the report of the committee of ten appointed by the National Educational Association upon the courses of instruction in secondary schools.

DR. EDMUND J. JAMES, professor of public finance and administration in the Wharton School of Finance and Economy, and professor of political science in the graduate department of the University of Pennsylvania, has accepted the professorship of public administration at the University of Chicago.

RICHARD E. DODGE, of the department of geography in Harvard University, has been appointed instructor in geography and geology in the Teachers' College, New York.

THE University of Pennsylvania expects an increase in the number of students in almost every department. The Freshman Class in the medical school numbers about 250, and the upper classes include 50 students from other institutions.

DR. ARTHUR D. FRIZELL has been appointed associate professor of mathematics in the University of the City of New York.

#### CORRESPONDENCE.

##### THE ABSORPTION OF TERRESTRIAL RADIATION BY THE ATMOSPHERE.

IN the issue of SCIENCE for August 16th Professor Hallock's account of Langley's bolometric studies contains the following statement: "Our atmosphere acts like a valve, transmitting in almost undiminished strength the short quick waves of energy radiated to us from the sun, but refusing absolutely to return the long slow waves in which the earth tries to radiate the energy back into space. Without this atmosphere we should all have been frozen long ago" (p. 178).

This leads to an interpretation of Langley's results so different from that which I have gathered from his writings that a brief comment on the subject seems desirable. It seems to me that Langley has shown that the solar rays find

the atmospheric valve badly clogged when they attempt to pass inward through it, and that the terrestrial rays find the valve very leaky when it tries to prevent their passage outward.

In the first place, regarding the entrance of solar rays, Langley found from his observations at Allegheny and Mt. Whitney that about half their energy is lost in passing down through clear air. He drew a curve to represent the distribution of energy in the spectrum of the high sun at Allegheny; the area included between the curve and its horizontal base line corresponding to 1.7 on a scale of calories. Another curve was constructed on the same base, but with ordinates representing the inferred distribution of energy in the solar spectrum outside of the atmosphere; the area here included corresponding to 3.5 calories ('Researches on Solar Heat,' Prof. Papers, U. S. Signal Service, XV., p. 144 and pl. XV.). Later statements increase the average percentage of transmission of the solar beam to 70% ('The Temperature of the Moon,' Mem. Nat. Acad. Sciences, 1888, IV., 89); but a valve that could, when open, allow only 70% of a current to pass through it would be regarded as a very imperfect mechanism.

In the second place, the action of the atmosphere on rays emitted from the earth is inferred chiefly from its action on rays emitted by the moon and by experimental radiators. The moon's spectrum is shown to consist of two parts; one part being simply reflected sunlight with its maximum energy in rays of 'luminous' wave-lengths; the other part being true lunar rays, emitted by true lunar radiant action, with their upper and lower limits at wave-lengths of one and perhaps fifty  $\mu$ , and their maximum energy in wave-lengths of seven  $\mu$ . These latter are in a spectral region of which no one had any knowledge whatever before Langley's studies about 1886. The solar rays, infra-reds as well as luminous and ultra-violet rays, are transmitted by glass, but the true lunar rays are entirely cut off by glass and must be studied with rock-salt prisms. The ratio of the energy of the solar rays reflected by the moon to that of the true lunar rays is: as one to seven (Mem. N. A. S., IV., 197; or Amer. Journ. Science, Dec., 1889, 435). As is the case with the rays